Developmental Pricing of Residential Water Use in South Africa

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Water Supply

- Low and variable annual average rainfall of 460mm
- High evaporation rates 1,100mm and 1,300mm which exceeds average annual rainfall in some areas
- Only 8% of rainfall converted into water runoff
- 70% of SA water supply from 4 rivers - all shared with other countries
Water Demand

- Urbanisation and industrialisation – increased demand of households and economic sectors
- Mismatch between location of water resources and population settlement patterns
- Negative water balances for 11 of the 19 Water Catchment Areas (WCAs)
- South Africa forecast water deficit of 1.7% by 2025
Water Scarcity Index
History Context & Background

Pre-1994 water legislation

- Riparian rights
- Supply-side management
- Inequitable distribution by household and sector

National Water Act 1998

- Public ownership
- Demand-side management
- Prioritisation of Water for human needs
- Legislated water licenses and pricing mechanisms
NWA Provisions

Three aims:

1. Equity
2. Sustainability
3. Efficiency

- Provisions for pricing water to capture economic value of water → commodification
Current Pricing Model

- Practical implementation - pricing models based on full cost recovery
- 2001 - free basic allocation of 6,000 litres per household per month
- Consumption > free allocation subject to increasing block tariff
- Cross-subsidisation from high to low consumption households
- Theoretical framework - pricing model based on utility pricing as outline by Ramsey where \( P \neq MC \)
- Price differentiation based on consumption levels
Increasing Block Tariffs

Source: Bond, 2008:47
Pricing Critiques

Two major critiques:

1. FBA insufficient long term survival and a dignified life
2. Determinants of step tariffs too narrowly defined as it is based solely on a municipalities need for cost recovery

Households quickly exhaust their initial allocation and are thereafter subject to unaffordable tariffs.
Pricing Critiques continued

- Ramsey pricing – size of steps determined by consumer responses to price and cost recovery

  **Price elasticity of demand**

- Little known about effects of water prices on household consumption behaviour
- Existing model omits impact of prices changes on consumers
- Disconnect between pricing theory and practical implementation of pricing models
Importance of Elasticity

**Elastic Demand**
Consumers responsive to changes in price

**Inelastic Demand**
Consumers unresponsive to changes in price

- Water is a necessity - demand for water should be inelastic across income groups
- BUT…some literature shows that the elasticity of demand for water for low income households is relatively elastic
- Apart from Bailey & Buckley – no other work on calculation of elasticity in SA
How should a water pricing model be designed in order to ensure that the goals of equity, efficiency and sustainability are achieved?
Contextualising the question

In answering this question, the research will specifically:

- Calculate the price elasticity of demand

  3 metros in Gauteng

  Water for residential use
Why Gauteng?
Research Themes

- Background
- Water value chain costing
- Development Water Pricing Model
- Household elasticity
- Industry cross-subsidisation
Background

- Historical, legislative & policy framework for water pricing in SA
- Trends in access to water since 1994 by metro – demographic component
Value Chain Analysis

- Structure of the water sector and composition of water use in Gauteng
- How is water infrastructure financed?
- Potential estimation of the negative externalities from water pollution during mining production and other industrial processes – to be included within the costs
Water Value Chain
Industry cross-subsidisation

- Possibilities for cross-subsidisation from industry to households?
- Sectoral analysis Gauteng Computable General Equilibrium (CGE) model
- National and provincial impact of cross-subsidisation on both households and industry
- Analysis of allocative efficiency across sectors
Household Elasticity

- Theoretical underpinnings of increasing block tariffs?
- How have households in the metros changed their consumption patterns in response to changes in water prices?
- Econometric estimation of the price elasticity of demand for water for households that reside in CoJ, CoT, Ekurhuleni
Data challenges

- Deriving accurate costing within each stage of the value chain – complex institutional structure
- Elasticity calculations – price and quantity data from metro’s (billing data)
- Data constraints - deemed consumption, flats and shared dwellings
- Mapping consumption data to income levels
Thank you

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